N 536 - Utilization of Nursing Research in Advanced Practice, Summer 2008

Tzeng, Huey-Ming

http://hdl.handle.net/2027.42/64943
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Research Design

Contributors
Sonia A. Duffy, PhD, RN
Lisa Kane Low, PhD, CNM, FACNM
Huey-Ming Tzeng, PhD, RN
Design Characteristics

- Maximizes control over factors to increase the validity of the findings
- Guides the researcher in planning and implementing a study
Level of Control: Quantitative Research

- Descriptive
- Correlational
- Quasi-experimental
- Experimental

Increased Control with Design
Concepts Relevant to Research Design (1)

**Causality**

- A  $\rightarrow$  B
- Pressure  $\rightarrow$  Ulcer

**Multicausality**

- Years smoking
- High fat diet  $\rightarrow$  Heart disease
- Limited exercise  $\rightarrow$  Heart disease
Concepts Relevant to Research Design (2)

- Probability: Likelihood of an outcome
- Bias: Slanting findings
- Manipulation: Treatment
- Control: All phases of design
Design Validity

- Measure of accuracy of a study

- Examined with critique of the following dimensions:
  - Statistical conclusion validity
  - Internal validity
  - Construct validity
  - External validity
Elements of a Strong Research Design (1)

- Controlling the environment of the study setting

- Levels of controlling:
  - Natural setting
  - Partially controlled setting: e.g., clinics
  - Highly controlled setting: e.g., laboratory
Elements of a Strong Research Design (2)

- Controlling the equivalence of subjects and groups
  - Random subject selection
  - Random assignment to groups
• Controlling the treatment

- Choose a treatment based on research and practice
- Develop a protocol for implementation
- Document the implemented treatment
- Use a check-list to determine the extent of completeness to which the treatment was implemented
- Evaluate the treatment during the study
Elements of a Strong Research Design (4)

- Controlling measurement
  - Reliability
  - Validity
  - Number of measurement methods
  - Types of instruments
Elements of a Strong Research Design (5)

- **Controlling extraneous variables**
  - Identify and eliminate extraneous variables via sample criteria, choice of settings, or research design
  - Random sampling
  - Sample: Heterogenous, homogeneous, or matching
  - Statistical control
Problems with Study Designs

- Inappropriate for the study purpose or the research framework
- Poorly developed designs
- The research methods were poorly implemented
- Inadequate treatment, sample, or measurement methods
Selecting a Design

- Is there a treatment?
  - Yes
    - Is the treatment tightly controlled by the researcher?
      - Yes
        - Will a randomly assigned control group be used?
          - Yes
            - Is the original sample randomly selected?
              - Yes
                - Experimental Study
              - No
                - No
        - No
          - No
            - Descriptive Design
          - Yes
            - Quasi-Experimental Study
    - No
      - No
        - Will the sample be studied as a single group?
          - Yes
            - Correlational Design
          - No
            - Yes

Research Design
Selecting a Descriptive Design

Examining sequences across time?
- Yes
  - Following same subjects across time?
    - Yes
      - Single unit of study
    - No
      - Studying events partitioned across time?
        - Yes
          - Repeated measures of each subject
        - No
          - Trend Analysis

- No
  - One Group?
    - No
      - Comparative Descriptive Design
    - Yes
      - Descriptive Design

Cross-sectional design

Research Design

<table>
<thead>
<tr>
<th>Cross-sectional design with treatment partitioning</th>
<th>Longitudinal design with treatment partitioning</th>
</tr>
</thead>
</table>
A Typical Descriptive Design

Clarification → Measurement → Description → Interpretation

- Variable 1
- Description of Variable 1
- Interpretation of Meaning
- Development of Hypotheses

- Variable 2
- Description of Variable 2

- Variable 3
- Description of Variable 3

- Variable 4
- Description of Variable 4
A Comparative Descriptive Design

Group I
{variables measured}

Group II
{variables measured}

Describe

Comparison of Groups on Selected Variables

Interpretation of Meaning

Development of Hypotheses
Selecting the Type of Correlational Design

Describe relationships between/among variables?

Predict relationships between/among variables?

Test theoretically proposed Relationships?

Descriptive correlational design

Predictive correlational design

Model testing design
A Descriptive Correlational Design

Measurement

Research Variable 1 → Description of variable → Interpretation of Meaning

Examination of Relationship

Research Variable 2 → Description of variable → Development of Hypotheses
A Predictive Design

Value of Intercept + Value of Independent Variable 1 + Value of Independent Variable 2 = Predicted Value of Dependent Variable
Selecting The Type of Quasi-Experimental Design

Control Group?
  Yes
    Pretest?
      No
        One-group post-test only design
        Comparison with population values?
          No
            Repeated Measures?
              Yes
                Compare treatment & control conditions?
              No
                Suggest reevaluating design
                One group pretest/post-test design
          Yes
            Strategy for Comparison
              No
                No
              Yes
                Yes

No
  Pretest?
    Yes
      Yes
      No

### Pretest-Post Test, Control Group Designs

<table>
<thead>
<tr>
<th>Randomly selected experimental group</th>
<th>PRETEST</th>
<th>TREATMENT</th>
<th>POST-TEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected control group</td>
<td>PRETEST</td>
<td>POST-TEST</td>
<td></td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:**
- Comparison of pretest and post-test scores
- Comparison of experimental and control groups
- Comparison of pretest-post-test differences between samples

**Example:** Your self (1990). The impact of group reminiscence counseling on a depressed elderly population.

**Uncontrolled threats to validity:**
- Testing
- Mortality

**Instrumentation:** Restricted generalizability as control increases
**Post-Test-Only Control Group Design**

<table>
<thead>
<tr>
<th>Measurement of independent variables</th>
<th>Measurement of dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Randomly selected experimental group</td>
<td>TREATMENT</td>
</tr>
<tr>
<td>Randomly selected control group</td>
<td></td>
</tr>
</tbody>
</table>

**Treatment:** Under control of researcher

**Findings:** Comparison of experimental and control groups


**Uncontrolled threats to validity:** Instrumentation, Mortality, Limited generalizability as control increases
### Nested Design

<table>
<thead>
<tr>
<th>Pain Control Management</th>
<th>Primary Nursing Care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Primary Care</td>
</tr>
<tr>
<td></td>
<td>Unit A</td>
</tr>
<tr>
<td>Traditional care</td>
<td>Unit A</td>
</tr>
<tr>
<td>PRN Medication</td>
<td>Unit B</td>
</tr>
<tr>
<td></td>
<td>Unit C</td>
</tr>
<tr>
<td></td>
<td>Unit D</td>
</tr>
<tr>
<td>New approach: “Around the clock” medication</td>
<td>Unit E</td>
</tr>
<tr>
<td></td>
<td>Unit F</td>
</tr>
<tr>
<td></td>
<td>Unit G</td>
</tr>
<tr>
<td></td>
<td>Unit H</td>
</tr>
</tbody>
</table>
Advantages of Experimental Designs

- More controls in design and conducting a study
- Increased internally validity
  - Decreased threats to design validity
- Fewer rival hypotheses
Advantages of Quasi-Experimental Designs

- More practical
  - Ease of implementation
- More feasible
  - Resources, subjects, time, setting
- More generalizable
  - Comparable to practice
Developing the Design Section of Your Proposal

- Identify the design
  - Name it specifically

- Provide a map of the design
- Discuss your rationale for using this design
- Describe threats to the validity of the chosen design